

US IOOS[®]: A Partnership for Lives and Livelihoods



Our Planet is Changing

**We need advanced tools to
understand and monitor our
oceans, coasts and Great Lakes**

Zdenka Willis
Director, US IOOS Program Office

Integrated, Interdependent, Indispensable

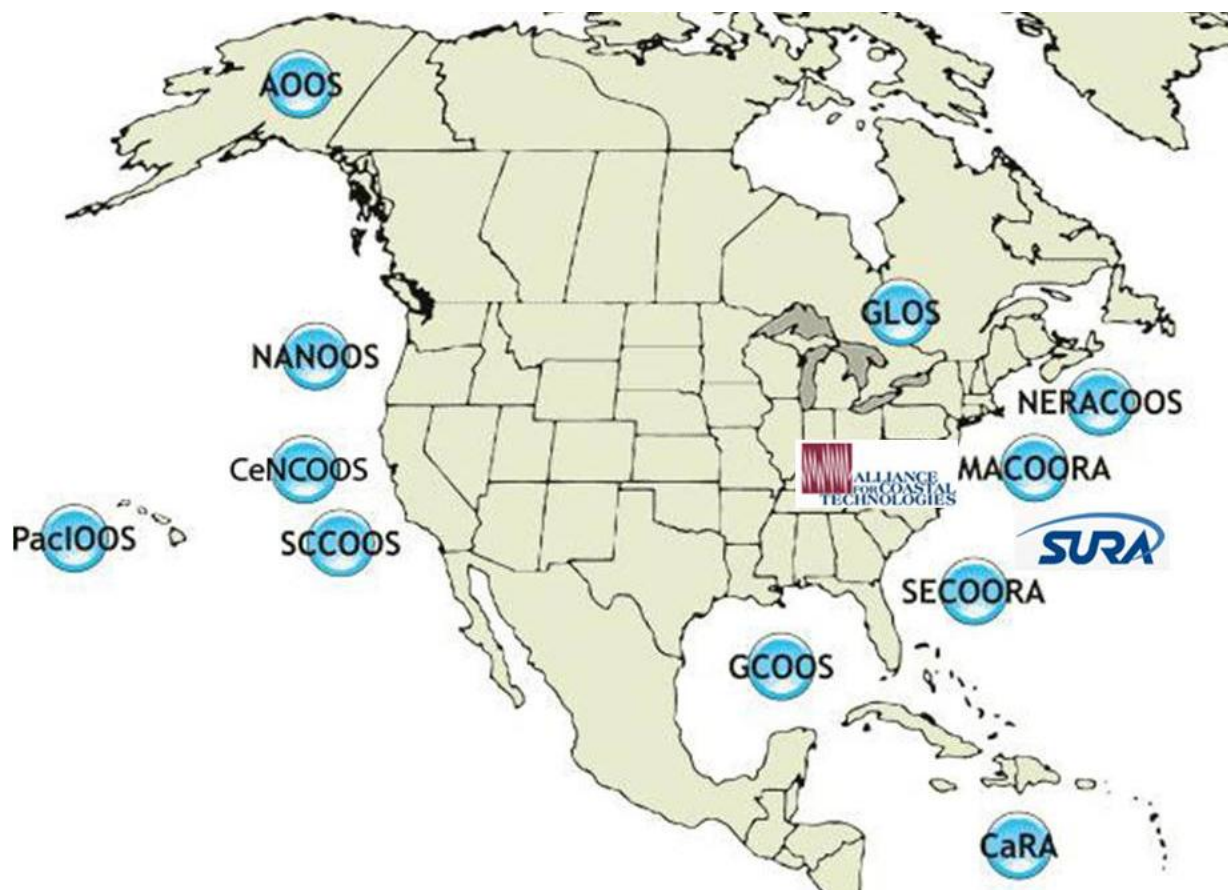
U.S. IOOS: Program Overview

WHO



WHAT

- Observations
- Data Management
- Modeling and Analysis



WHY: 7 Goals, 1 System

Weather and climate change
Maritime operations
Natural hazards
Homeland security
Public health risks
Healthy coastal ecosystems
Sustain Living Marine Resources



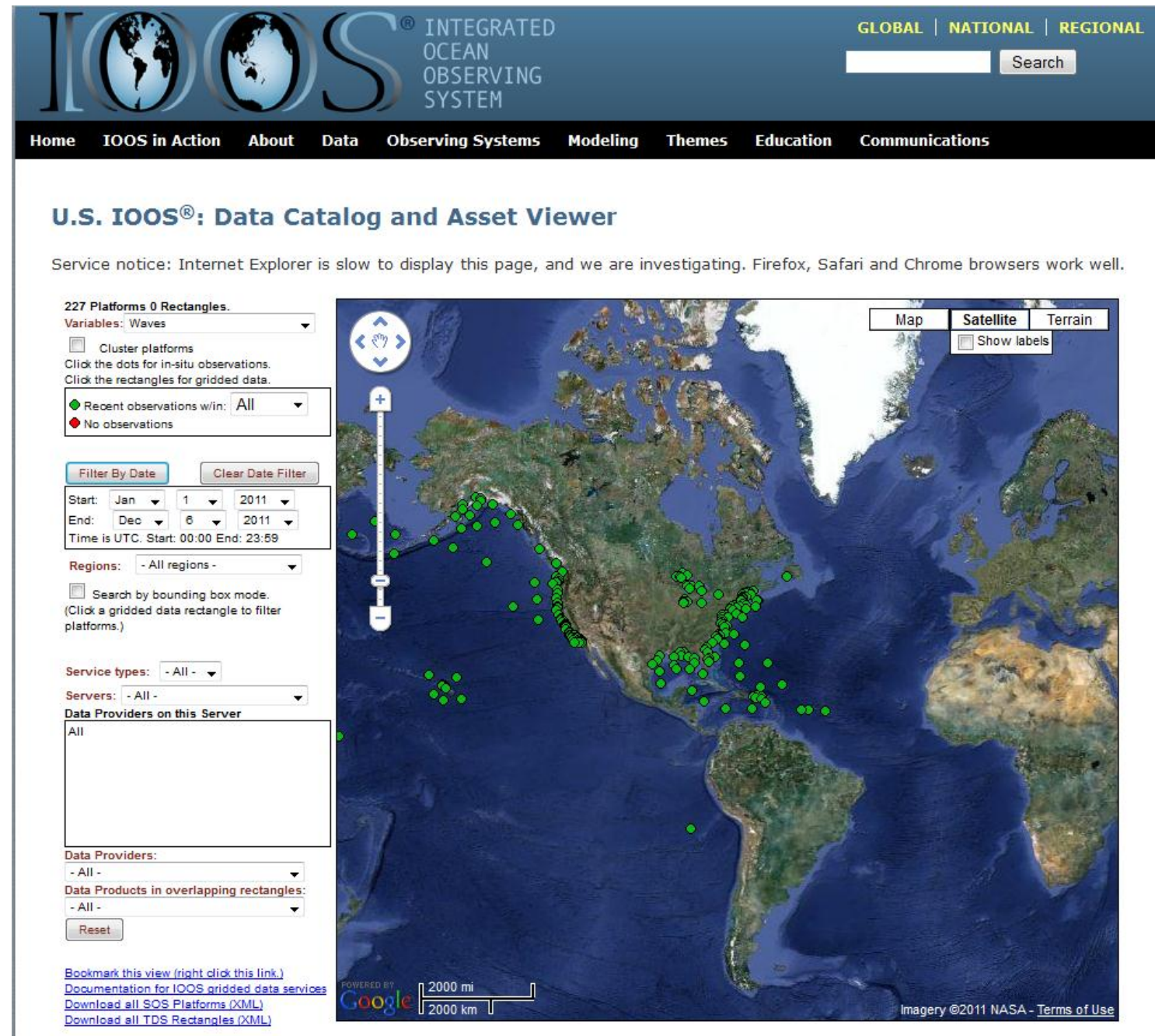
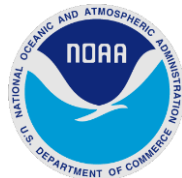
Integration

Interdependent

Indispensible

Observation Networks: Waves

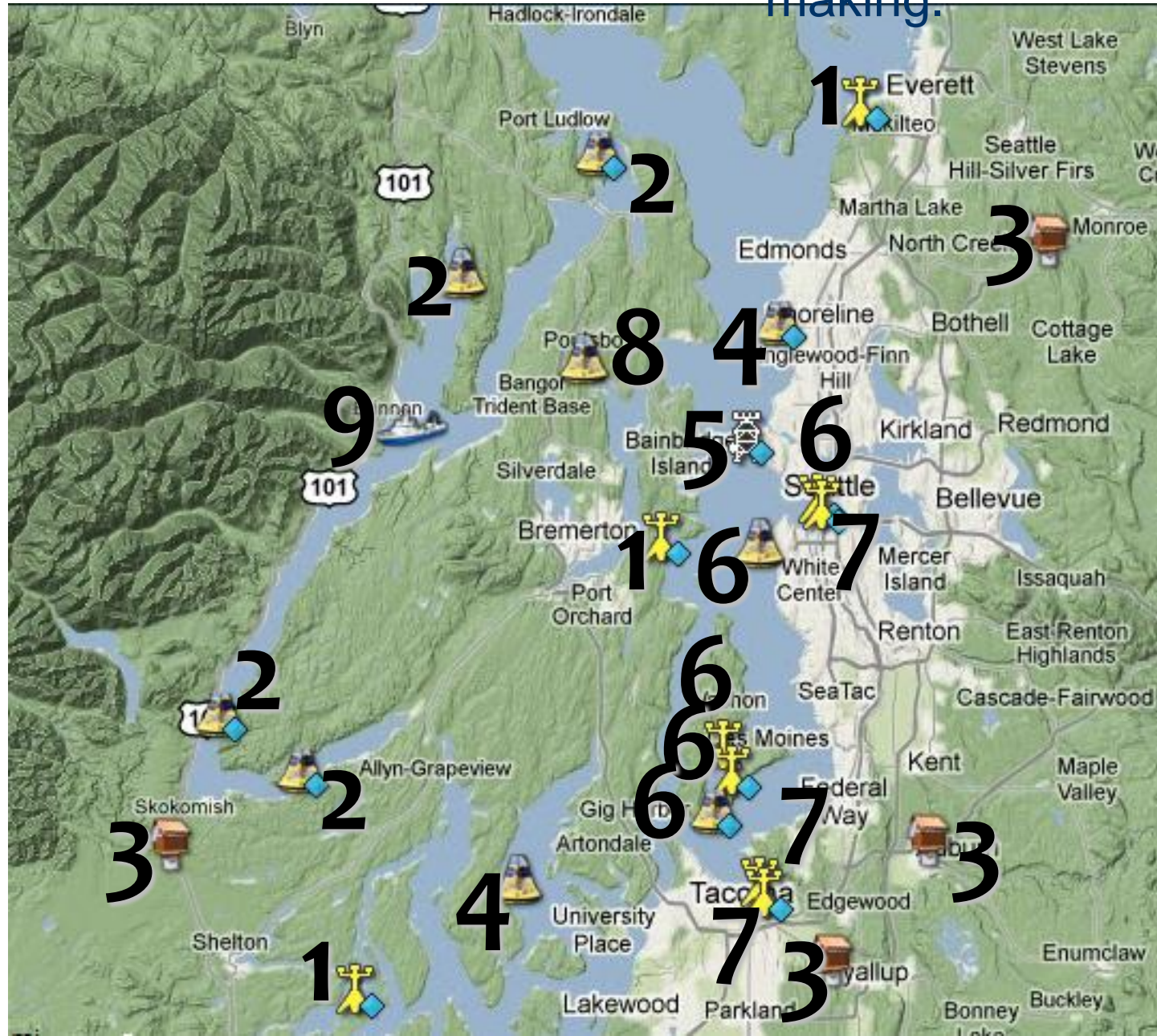
- Nation's wave data now accessible
 - 181 platforms in 2008; 227 2011
 - Wave Plan called for 296
 - New IOOS supported wave sites being deployed collaboratively with USACE/ CDIP program
 - Some platforms need to be upgraded to directional wave measurements



Data Integration - Community

The value of NANOOS

NANOOS is a community of people that provides data through one place for quicker decision-making.



1. Washington Dept of Ecology
2. Oceanic Remote Chemical-optical Analyzer (ORCA)
3. USGS
4. University of Washington – Applied Physics Lab
5. NOAA National Data Buoy Center
6. King County
7. NOAA National Ocean Service
8. IntelliCheck Mobilisa
9. Hood Canal Dissolved Oxygen Program

Data Integration – Regional to National

IOOS Catalog

[Help](#)

Service notice: We have found that Internet Explorer is slow to display this page, and we are investigating. Firefox, Safari and Chrome browsers work well.

1444 Platforms 75 Rectangles.

Variables:

☐ Cluster platforms

Click the dots for in-situ observations.

Click the rectangles for gridded data.

☒ Recent observations w/in:
☒ No observations

Filter By Date

Start:
End:

Regions:

☐ Search by bounding box mode.
(Click a gridded data rectangle to filter platforms.)

Service types:

Servers:

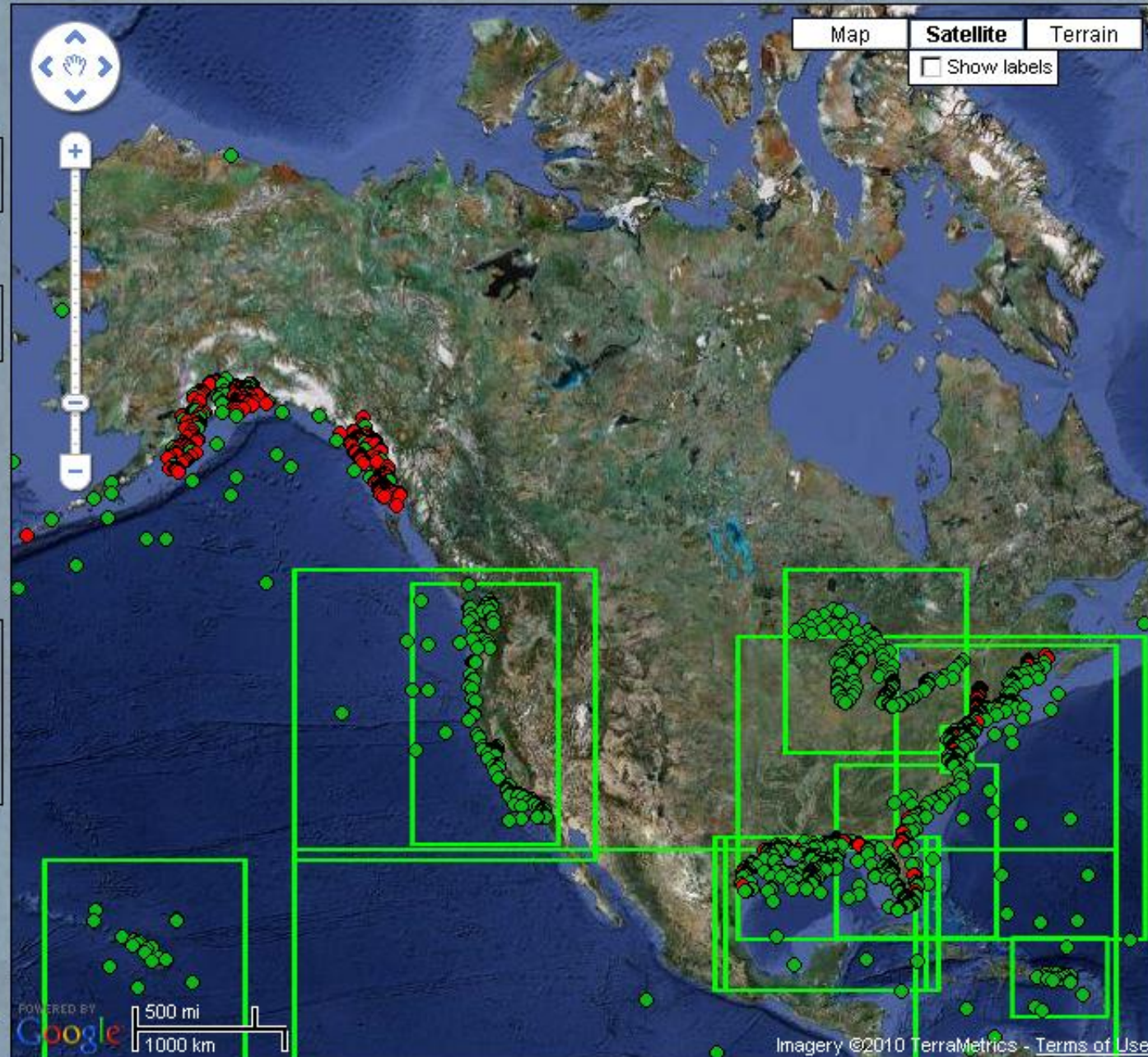
Data Providers on this Server

All

Data Providers:

Data Products in overlapping rectangles:

[Bookmark this view \(right click this link.\)](#)
[Documentation for IOOS gridded data services](#)
[Download all SDS Platforms \(XML\)](#)
[Download all TDS Rectangles \(XML\)](#)



Million of Observations

A/Navy
ls

S - WFOs

U.S. IOOS[®]: Modeling Testbed

- 5 teams, 64 scientists/analysts
- SURA is overall lead for execution
- Began in June 2010; now in the second year
- Multi-sector engagement (federal agency, academia, industry)
- **Goals:**
 - Less about model than process
 - Focus is on stable infrastructure (testing environment, tools, standard obs) and transition to operations
 - Enable Modeling and Analysis subsystem

Coastal Inundation
Gulf & Atlantic Coast
Rick Leuttich, UNC-CH

Shelf Hypoxia
Gulf of Mexico
John Harding, USM

Estuarine Hypoxia
Chesapeake Bay
Carl Friedrichs, VIMS

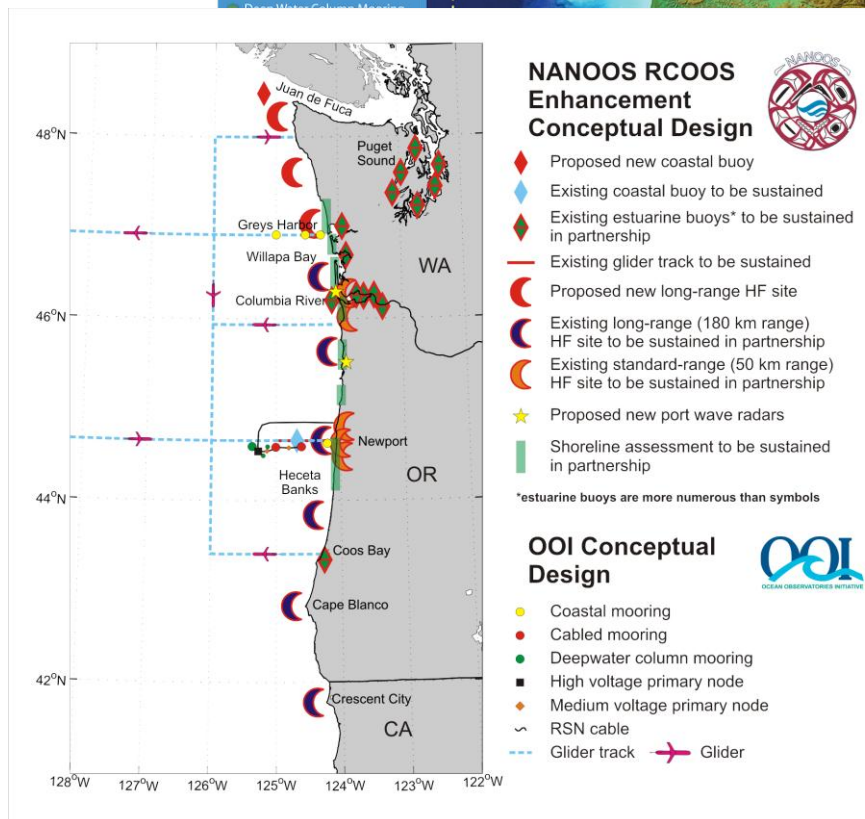
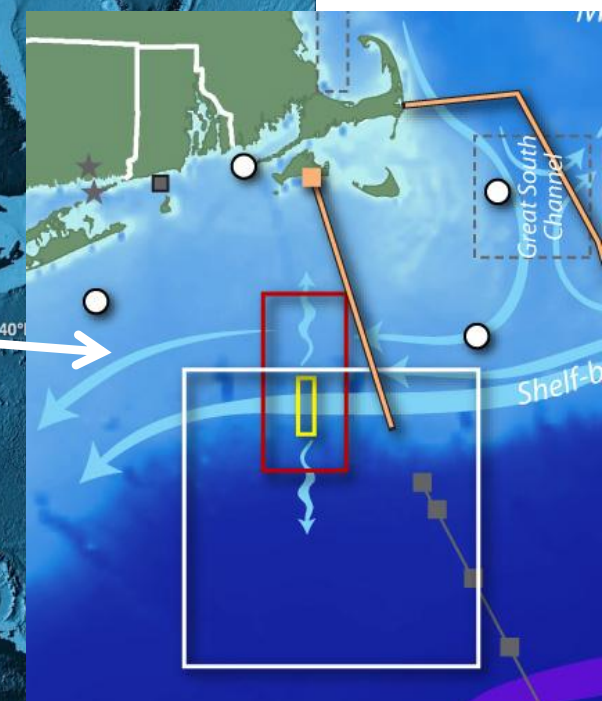
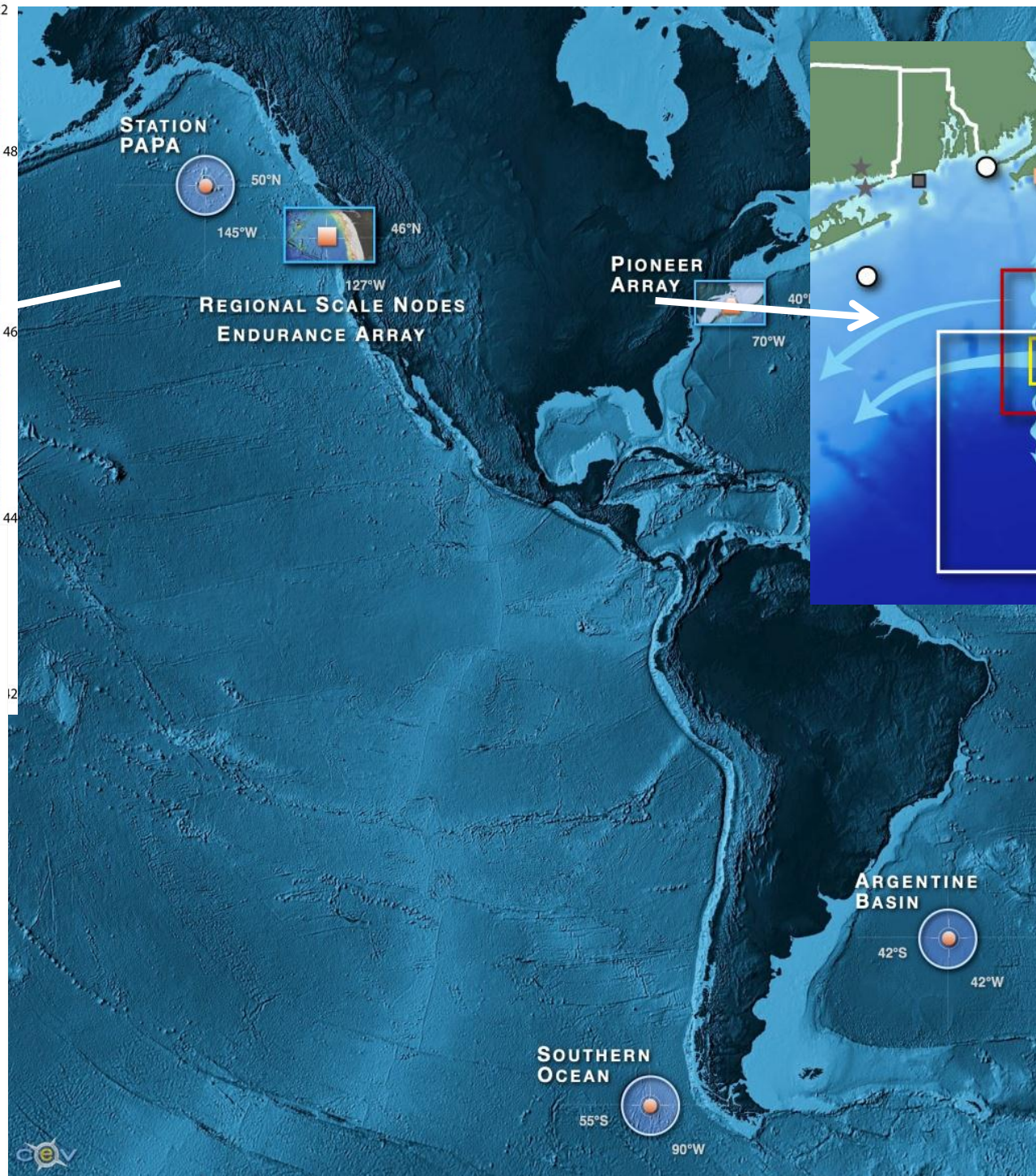
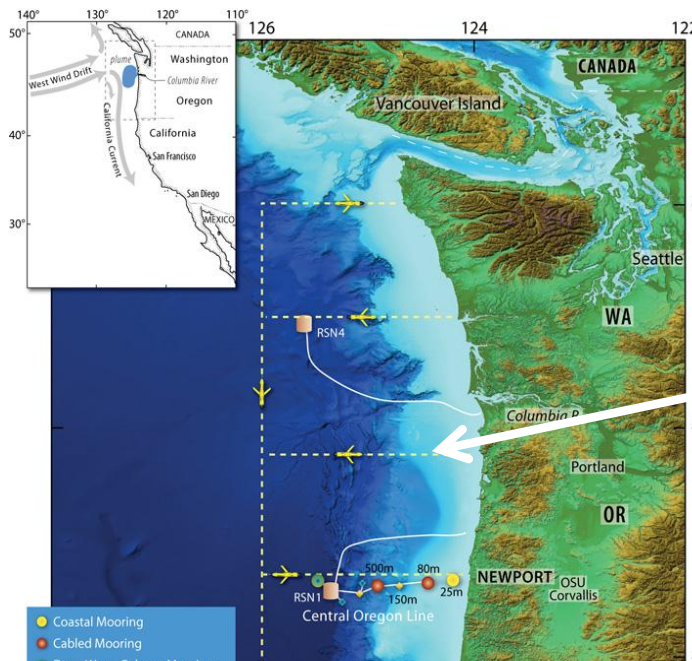
Cyber Infrastructure
Eoin Howlett, ASA

Testbed Advisory
Evaluation Group
Rich Signell, USGS



Integration
Interdependent
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OOI – Research and Development Compon



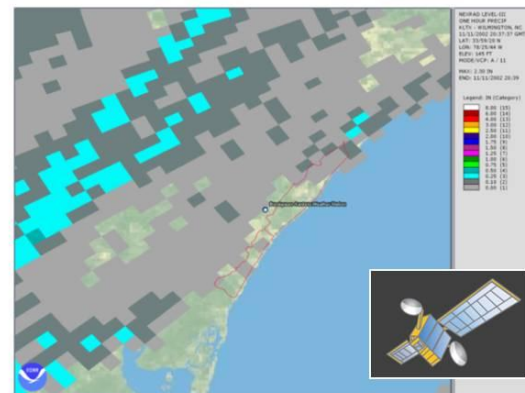
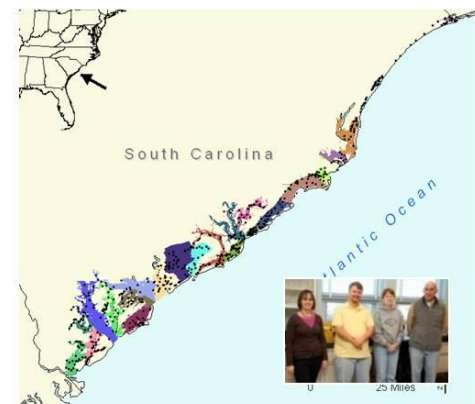
Beach Water Quality Predictive Modeling

Data assimilation from multiple sources including:

Field programs

Observing systems

Remote sensing / Models



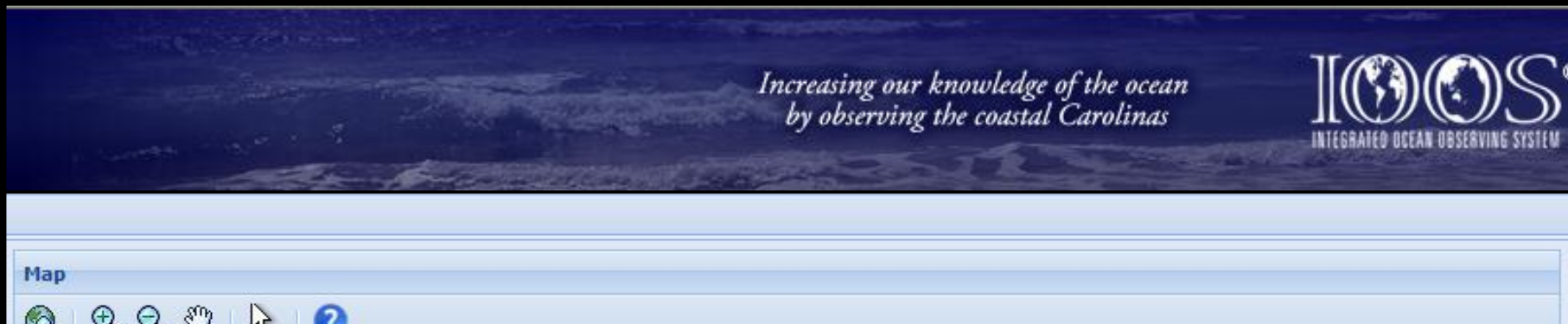
- Bacteria density
- Salinity
- Air/water temperature
- Tide
- Weather

- Rainfall
- Currents
- Salinity
- Wind

- Salinity
- Air/water temperature
- Rainfall
- Currents
- Wave activity

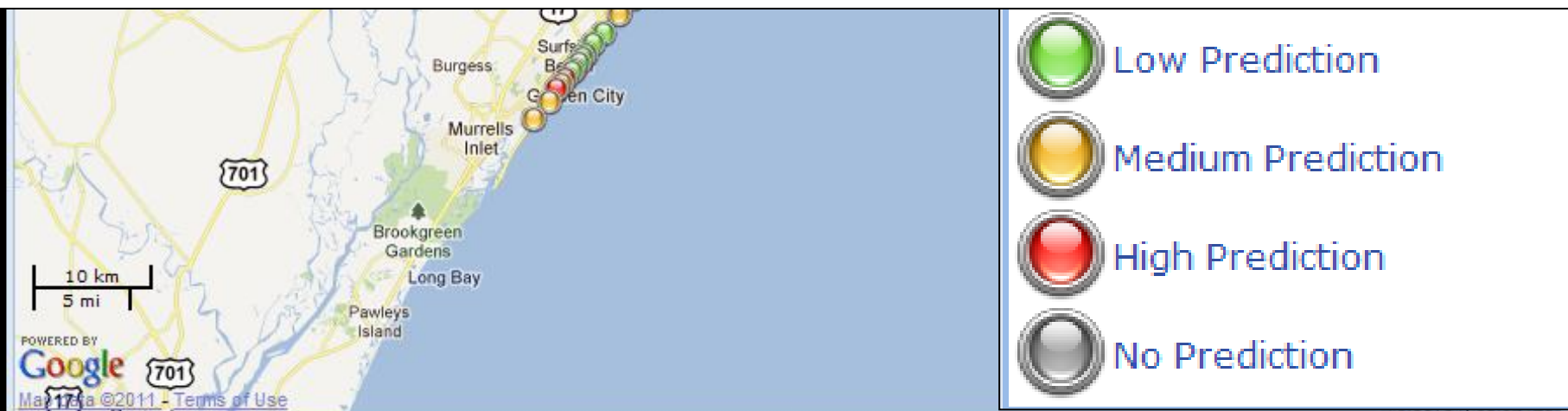


Beach Water Quality Predictive Modeling



"This model has reduced the sampling burden for our Regional staff; but the major benefit has been the Department's quicker response time for posting beach advisories and subsequent enhancement of our agency's primary mission of protecting the public health."

David E. Tilson, PE, Chief, Bureau of Water, South Carolina Department of Health and Environmental Control (SCDHEC)



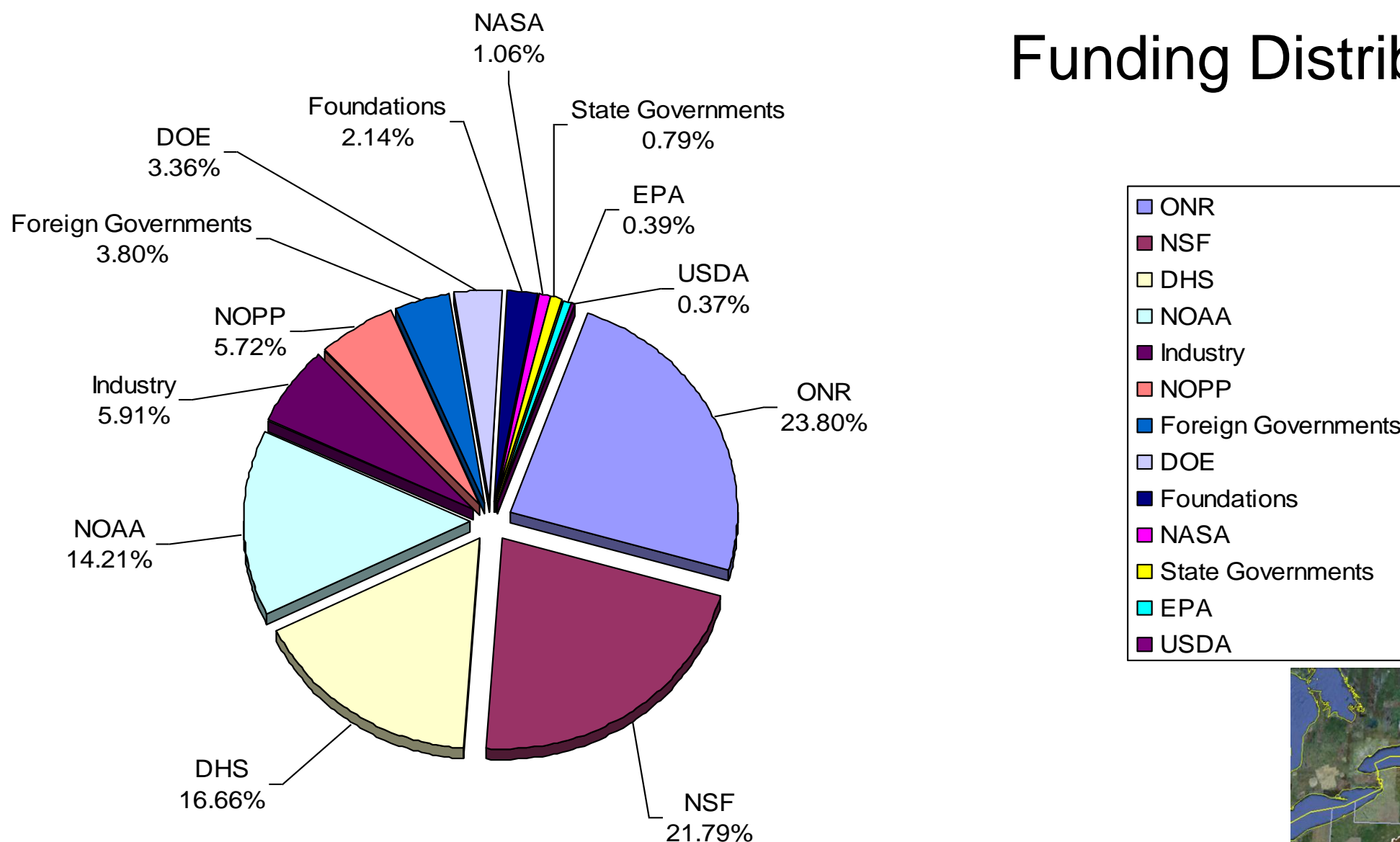
U.S. Integrated Ocean Observing System (IOOS)



MARACOOS

Ocean Information for a Changing World

Funding Distribution



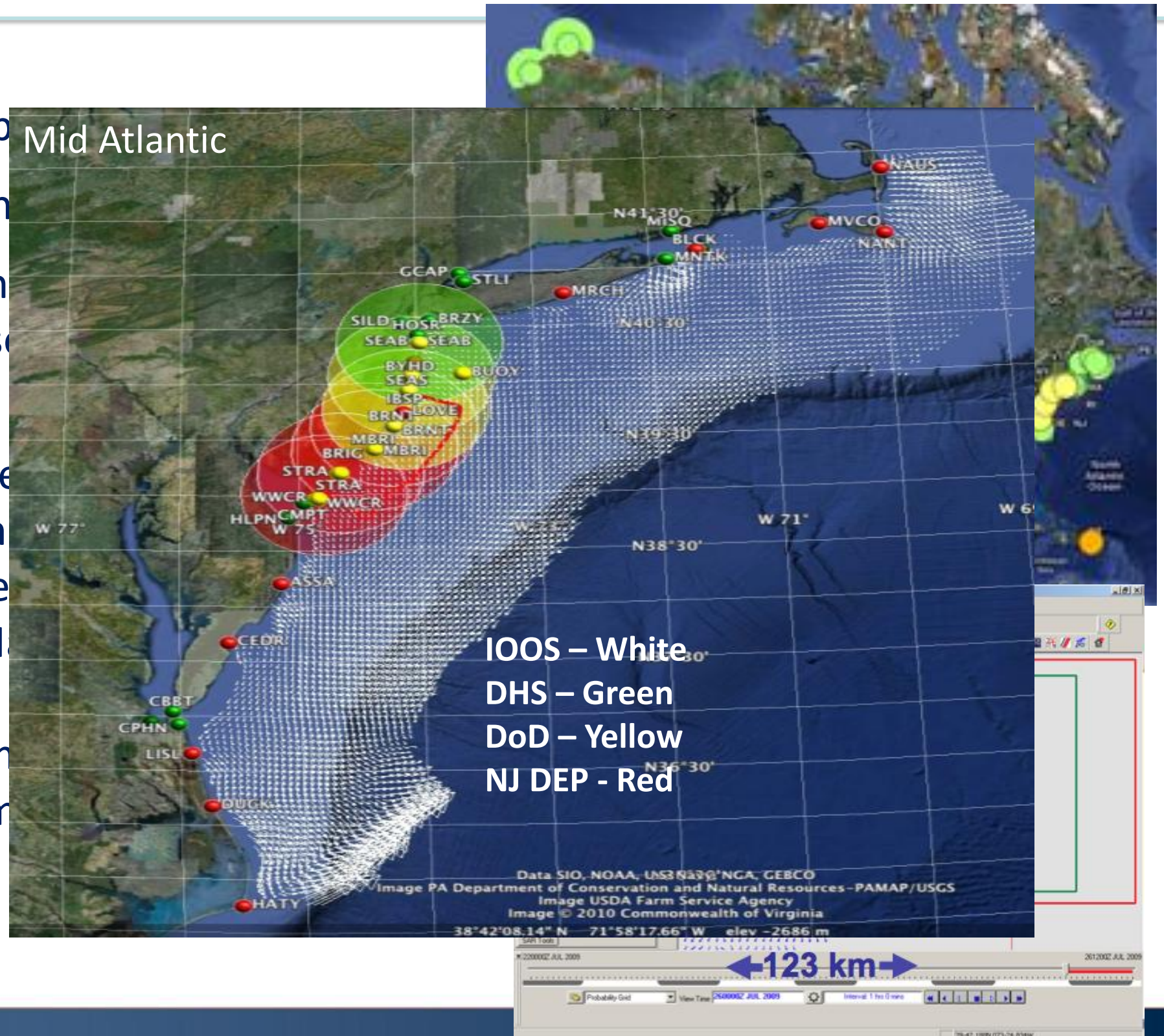
Observing Networks: HF Radar

Stakeholders

- > 30 institutions operating in the Mid Atlantic
- Used by >40 governments
- Partnership with In
- CODAR Ocean Sensor

Who Depends on it

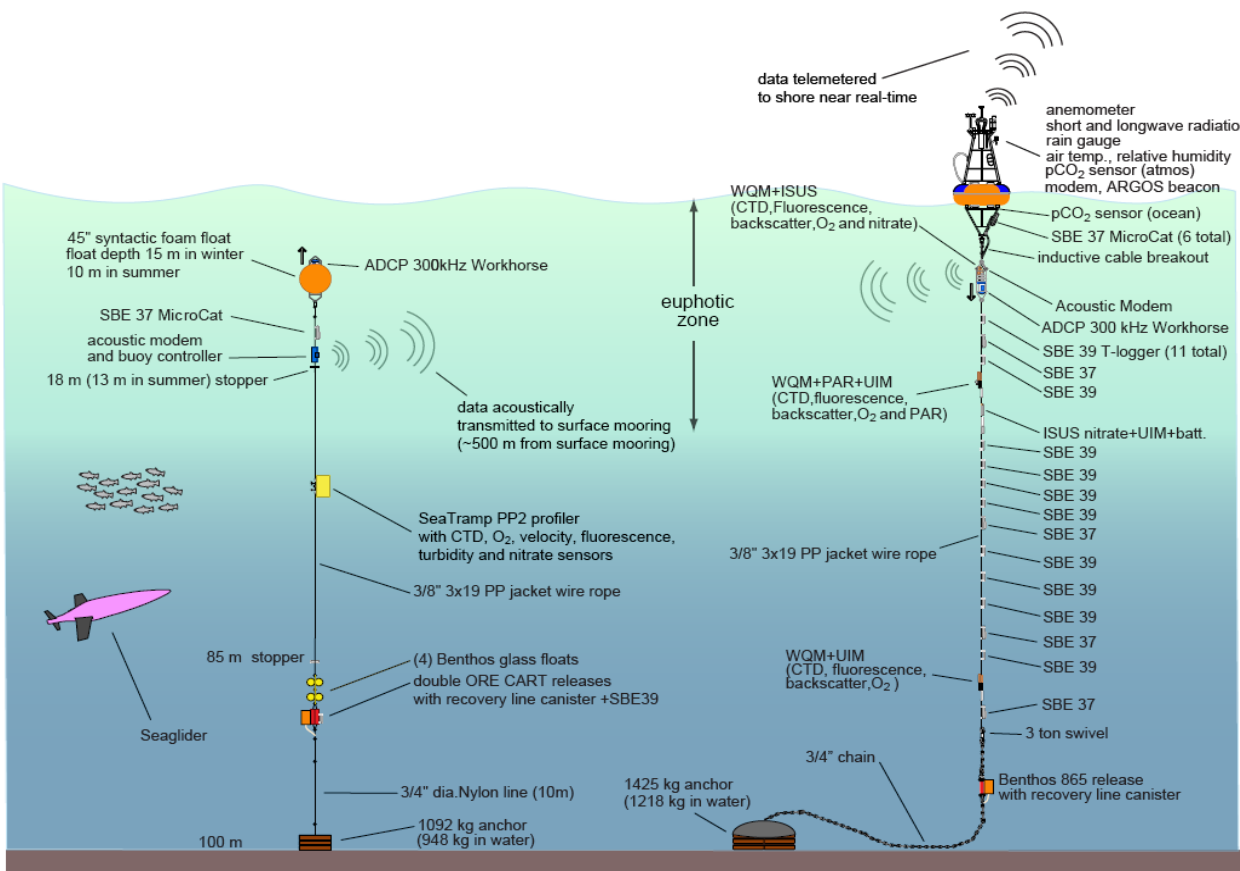
- USCG Search and Res
- Water quality; Crim
- Commercial marine
- Offshore energy; H
- Marine fisheries
- Emerging - Maritim
- Emerging – Tsunam



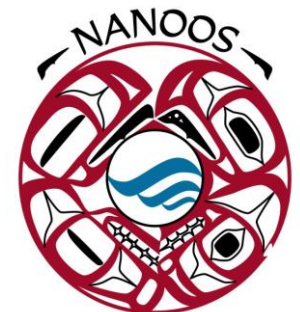
Decreases search area by 66% in 96 hours 13

U.S. IOOS®: Working with NGO community

M. J Murdock Trust: seeks to enrich the quality of life in the Pacific Northwest by providing grants and enrichment programs to non-profit organizations that seek to strengthen the region's educational, spiritual, and cultural base in creative and sustainable ways.

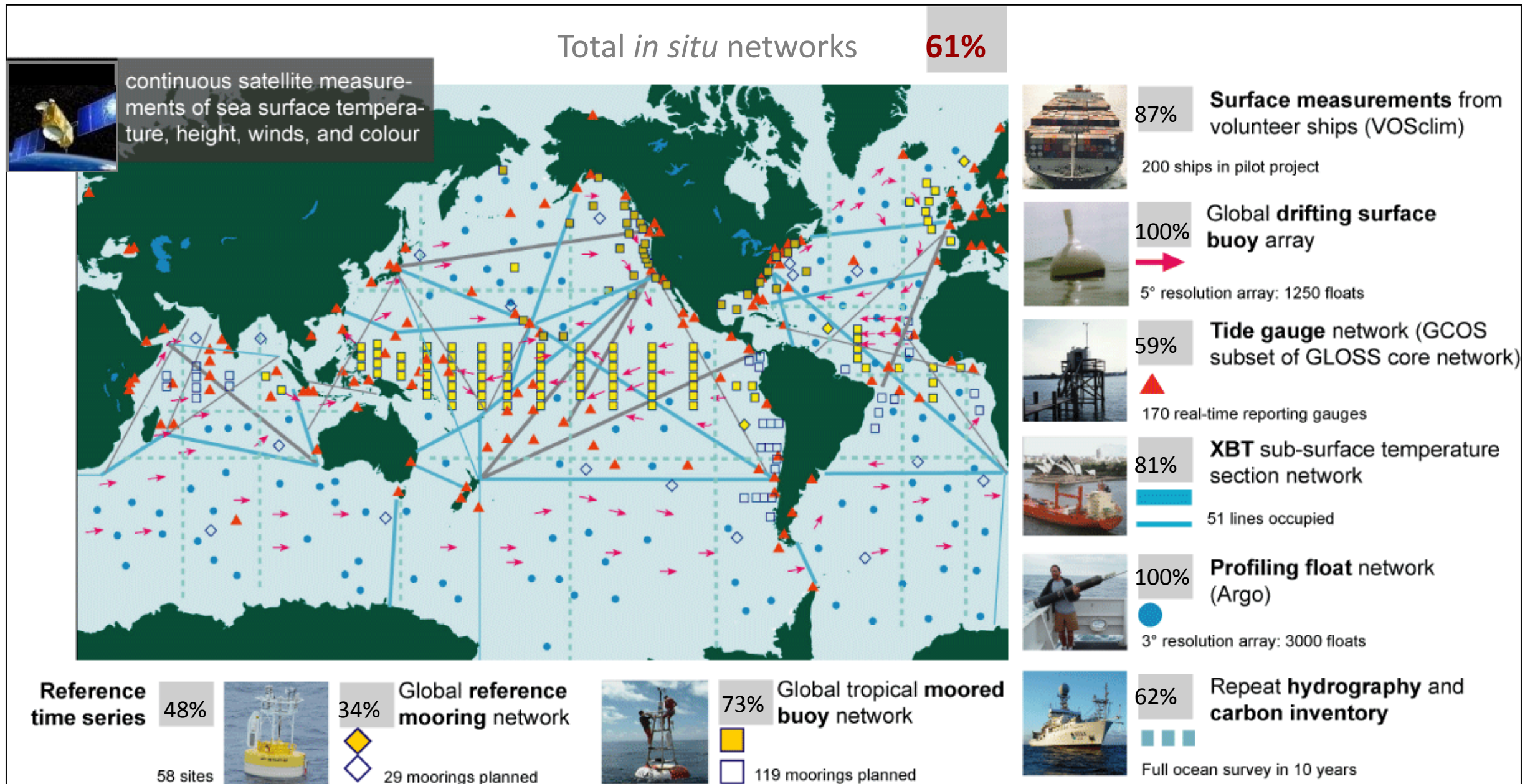


IOOS®
INTEGRATED OCEAN OBSERVING SYSTEM



A tool that enables the Nation to track, predict, manage and adapt to changes in our marine environment and delivers critical information to decision makers to...

Global Component: Global Ocean Observing System for Climate





Integration



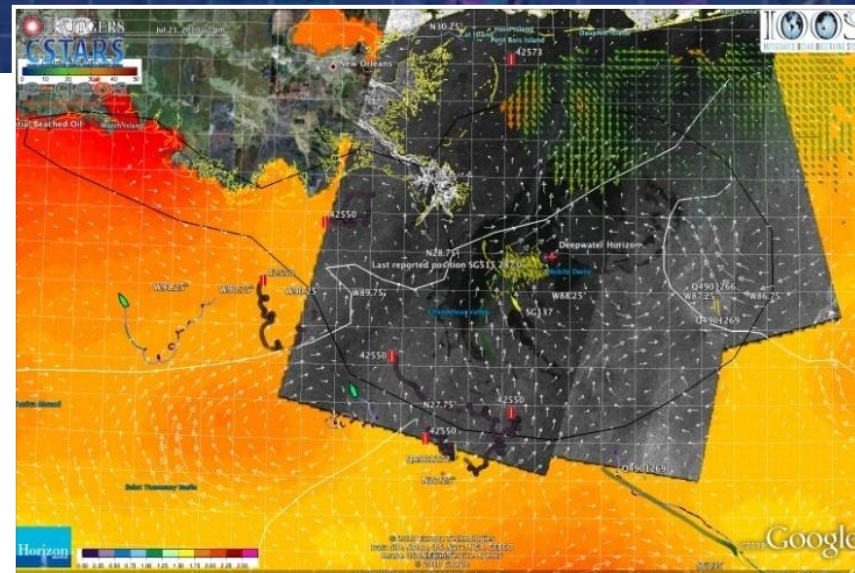
Interdependent

Indispensible

Responding to Crisis: Deepwater Horizon

U.S. IOOS partnership demonstrated ability to:

- Quickly deploy technologies: Gliders and HF radar, saving resources/improving safety
- Models/Imagery ingested into NOAA/Navy models
- Data assimilation improved spill response decision-making and public understanding



Bonnie heads towards Louisiana

July 24th, 2010

Official discussion indicates the track guidance has Bonnie heading down the center of the envelope.

<http://www.nhc.noaa.gov/text/refresh/HATCDAT3+shmi/240847.shtml?>

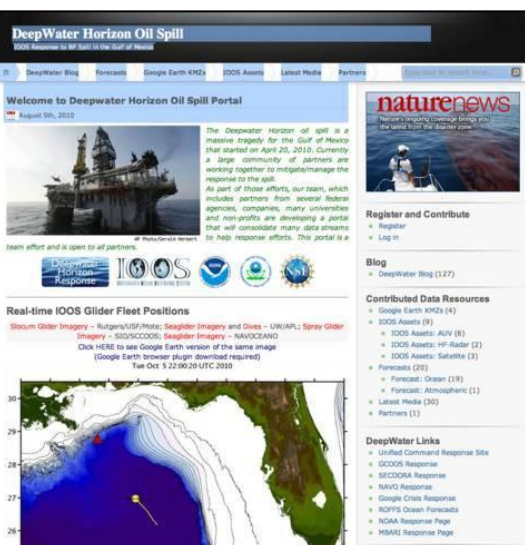
Figure 1: Official track forecast for Tropical Storm Bonnie from the NOAA National Hurricane Center. Official discussion indicates the track guidance has Bonnie heading down the center of the envelope.

Figure 2: Collection of the offshore wind reports from Oceanweather. The counterclockwise wind pattern around Bonnie's broad low pressure field is observed.

Figure 3: Highest resolution satellite imagery of the Deepwater Horizon oil spill. The largest slicks are on the right side of the hurricane track.

HFR validation of SABGOM Forecast with satellite detected oil slicks

HFR data informed NOAA trajectory forecasts

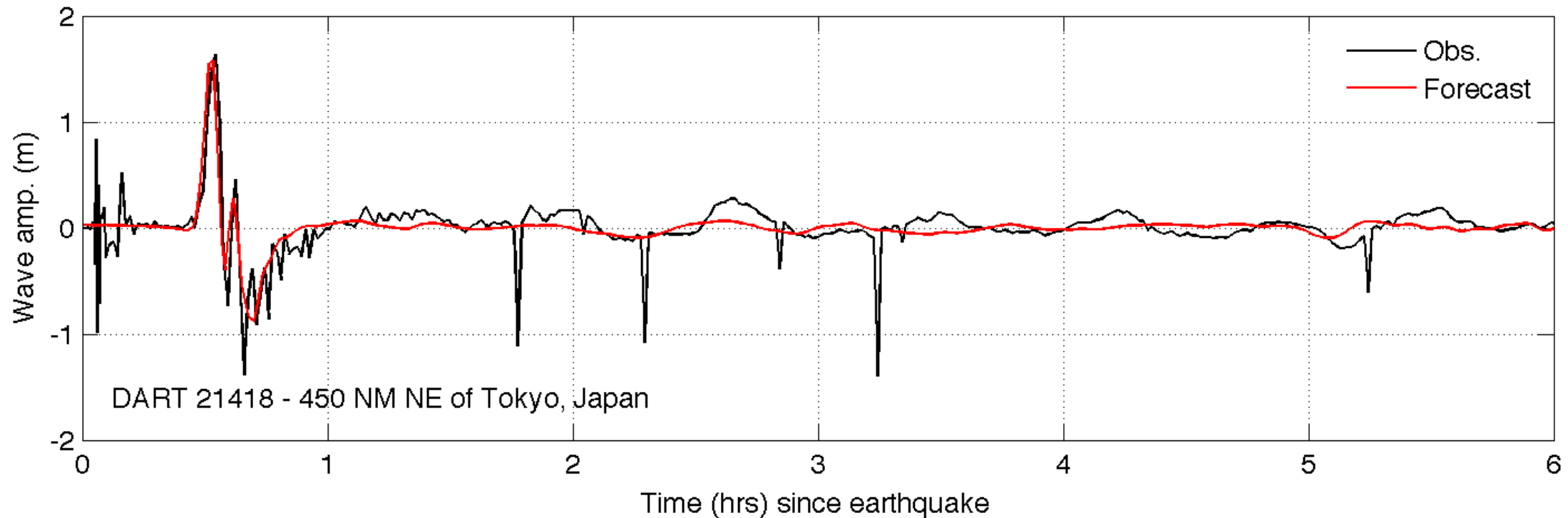


Web Portal



Responding to Crisis: Japan Tsunami Warning

Graphic courtesy NOAA / PMEL / Center for Tsunami Research



Honshu (northeastern Taiheiyou) tsunami, 11 March 2011



NOAA Center for Tsunami Research

- International buoy program
- Tsunami wave at DART Station 21418 located 470n mi northeast of Tokyo.
- Largest peak 1.8M



Responding to Crisis: Japan Tsunami Response

CeNCOOS:

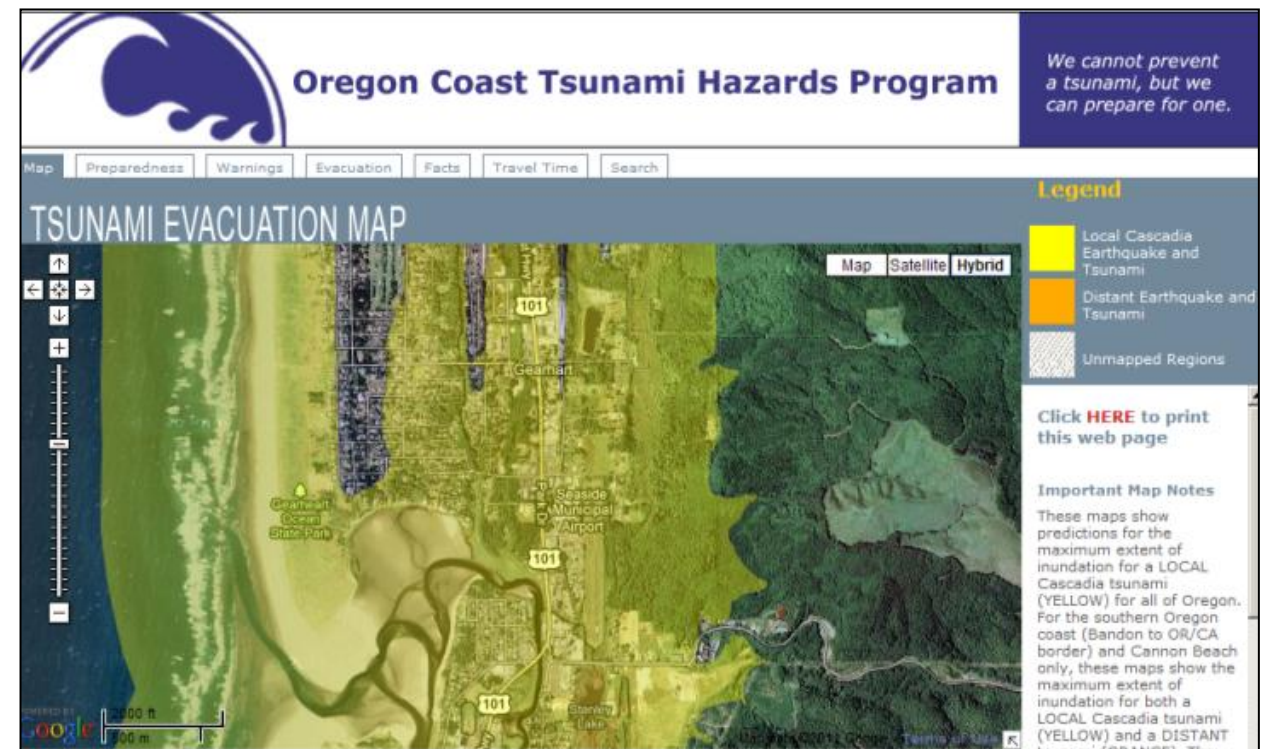
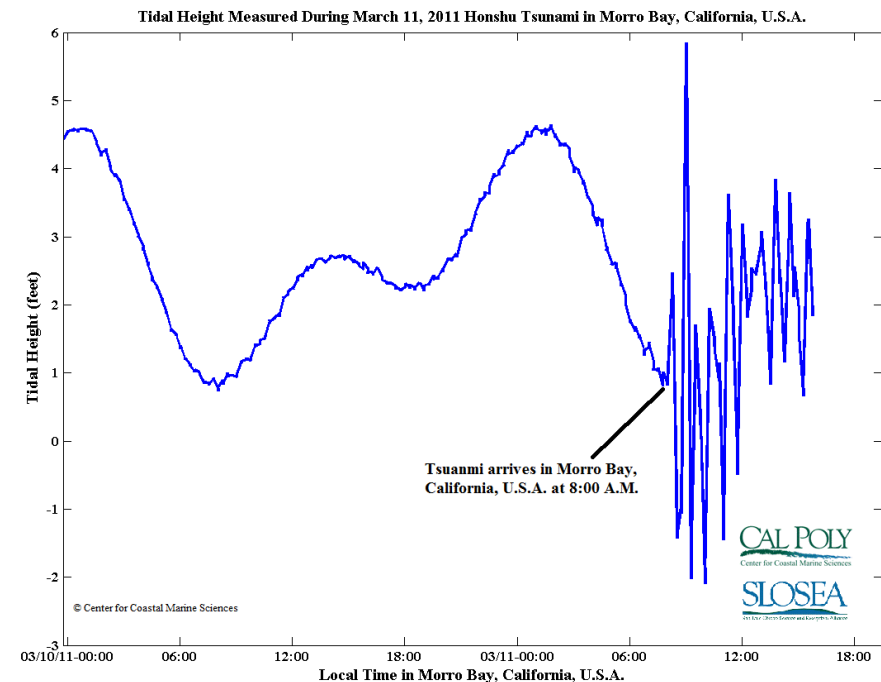
- Recorded the tsunami passage with U.S. IOOS sensors
- Five-fold increase in web traffic

NANOOS:

- Featured “Tsunami Evacuation Zones for the Oregon Coast” application
- NANOOS Visualization System provided easy access to current and water height data
- Four-fold increase in web traffic

PacIOOS:

- Provided the only real-time water level and turbidity measurements for Waikiki
- Ten-fold increase in web traffic

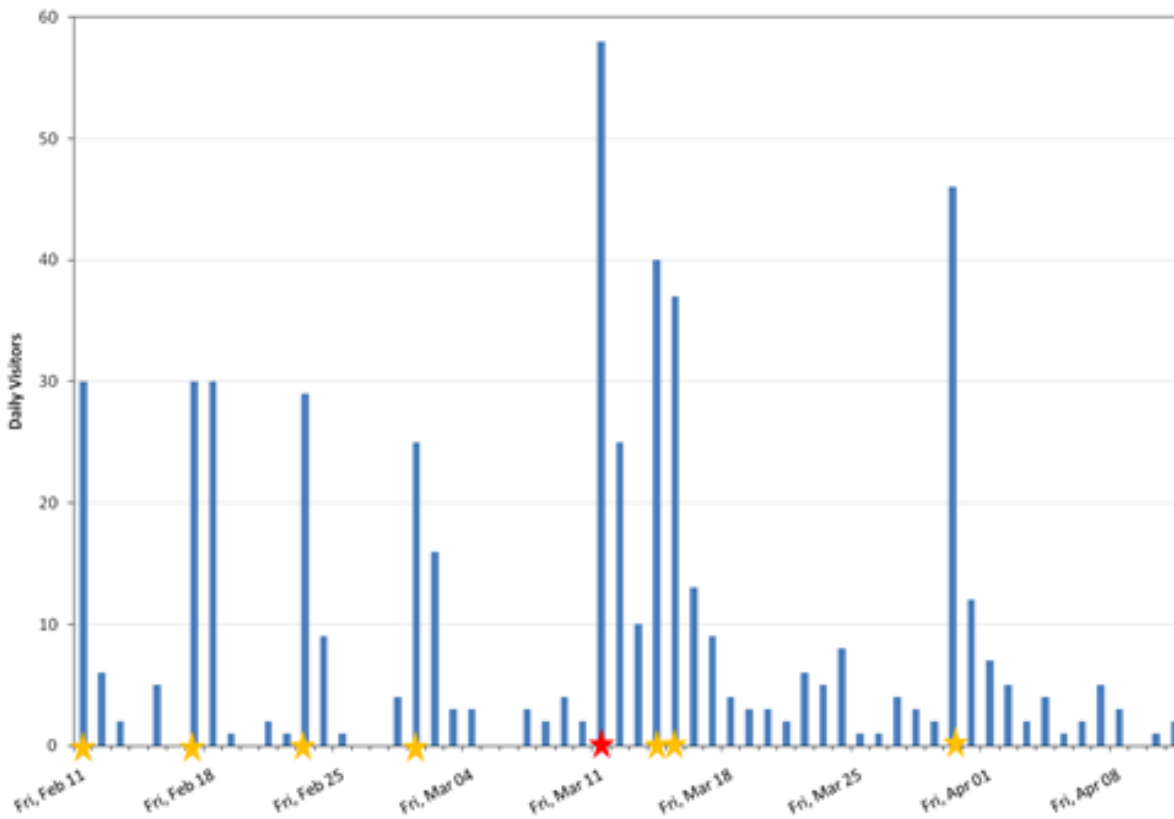


Using Social Media to reach out in new ways

Types of Information:

- a) Initial info including link to tsunami portal;
- b) graphs of water level for various locations;
- c) synthesis information

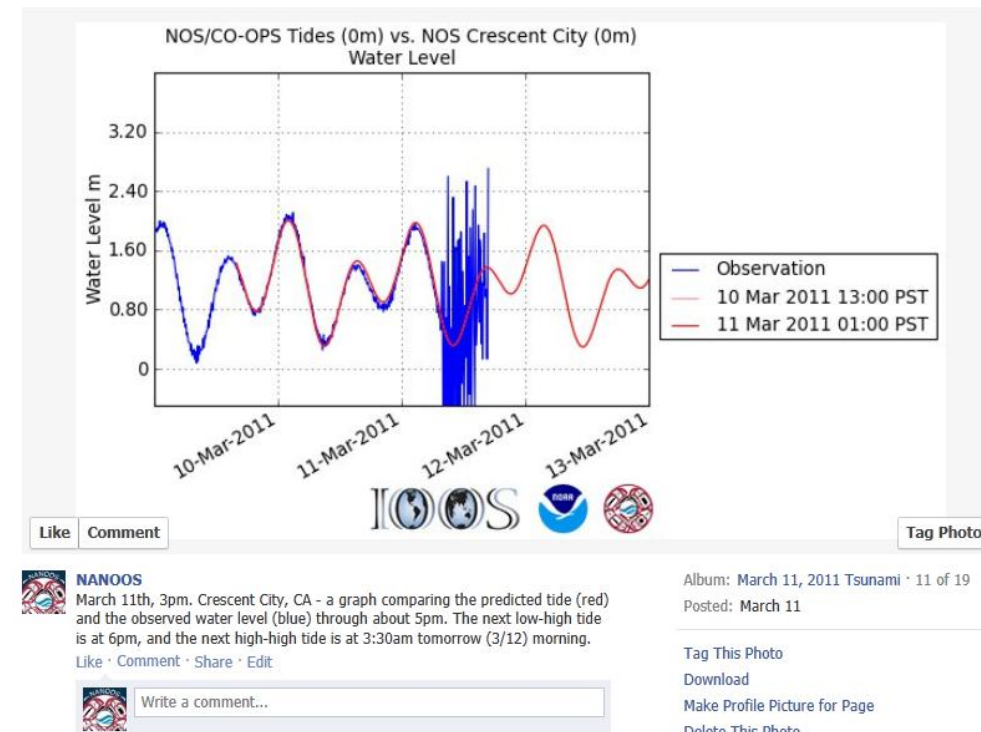
Daily Visitors to the NANOOS Facebook Page



Facebook:

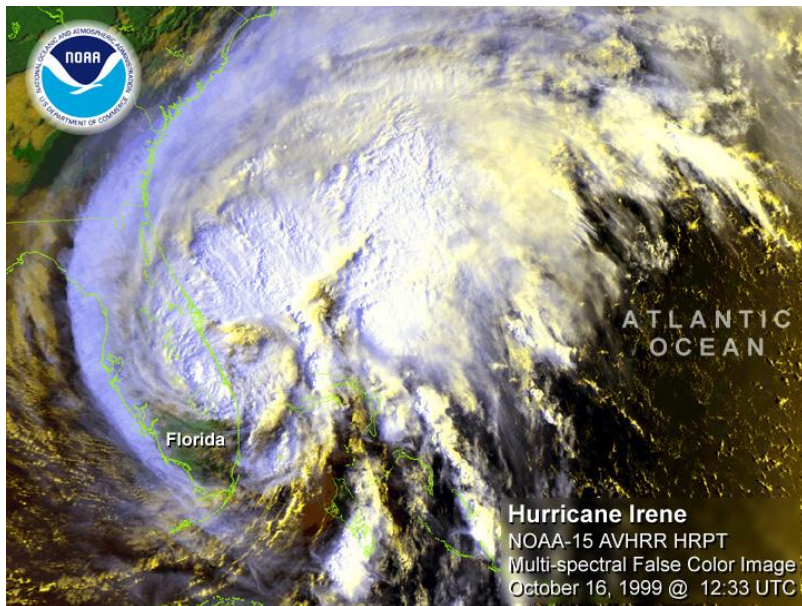
★ = Posts

★ = Tsunami event

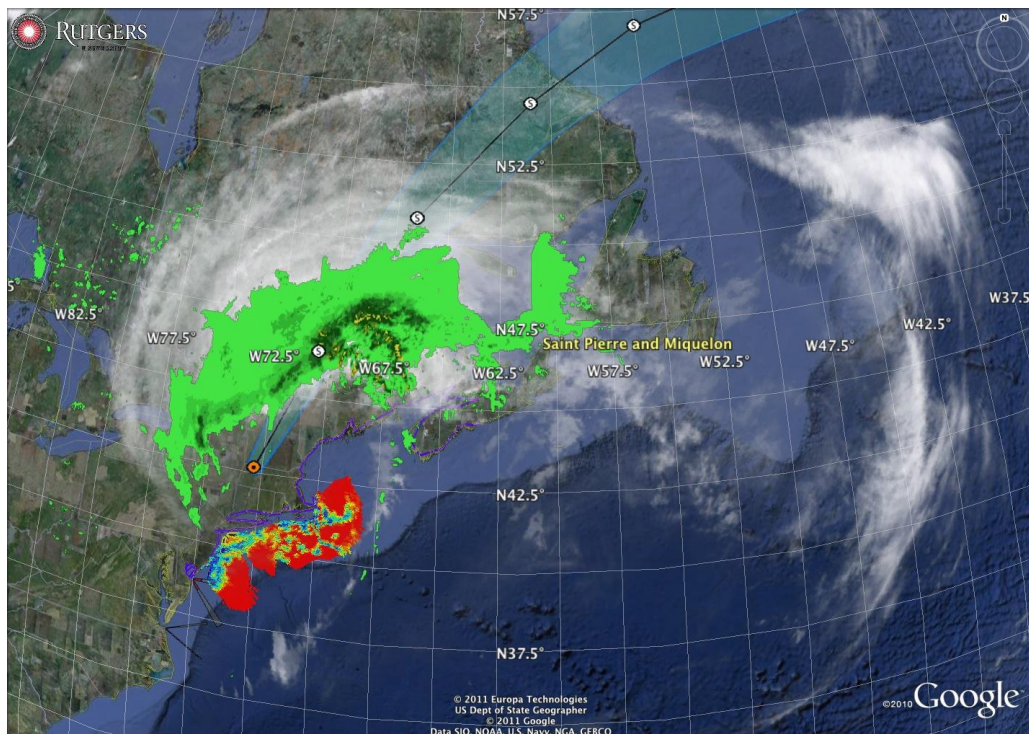


www.facebook.com/NANOOS.PNW

Responding to Crisis: Hurricane Irene



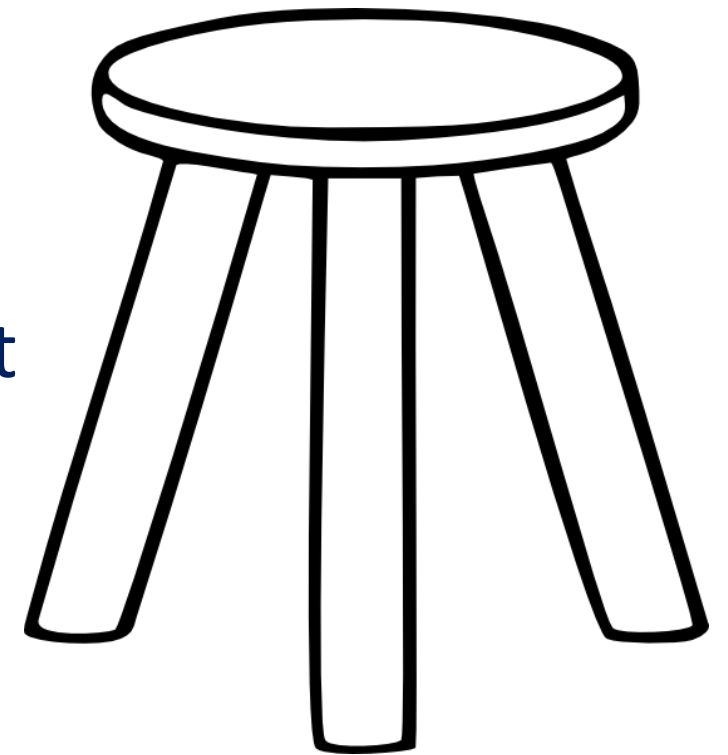
Around-the-clock data and other information
before, during and after hurricanes



- **CaRa:**
 - 4 buoys provided real-time observations
- **SECOORA:**
 - Buoys used to initialize models/verified forecasts.
 - Forecast system used by Coast Guard, North Carolina Division of Emergency Management, National Hurricane Center, USACE, and multiple National Weather Service Forecast Offices
- **MARACOOS:**
 - Surface currents by the High Frequency Radar
 - Delivered forecasts to New Jersey Board of Public Utilities, Connecticut governors office and Delaware River Basin Commission
 - Underwater glider collected data
- **NERACOOS:**
 - Buoys critical to the National Weather Service
 - Local television stations in Connecticut reported conditions from the NERACOOS buoy
 - Northeast Coastal Ocean Forecast System (NeCOFS) provided to the National Weather Service

U.S. IOOS[®] : Challenge

- Leveraging resources yields positive results.
- Multi-sector approach is a hallmark of IOOS but adds complexity
- As we are now interdependent both from a fiscal, science and operational perspectives loss of any 1 funding stream means significant risk to the entire enterprise
- So what is needed?
 - Unified portrayal of what Ocean Observing is critical
 - Coordinated message
 - Continued mutual engagement



U.S. IOOS®: A National Endeavor but in a Global Context

 **INTEGRATED OCEAN OBSERVING SYSTEM**

GLOBAL | NATIONAL | REGIONAL

Home | IOOS in Action | About | Data | Observing Systems | Modeling | Themes | Education & Outreach



In spite of the damage, RU23 glider was able to show the changing wind driven currents combined with the rotating inertial currents associated with the tail of hurricane Irene

Global

National

Regional

Data and services to meet local needs



U.S. IOOS®, Integrated Ocean Observing System

U.S. IOOS is a vital tool for tracking, predicting, managing, and adapting to changes in our ocean, coastal and Great Lakes environment.

- **Safety:** IOOS helps ensure the safety and security of citizens now and into the future.
- **Economy:** IOOS unlocks economic and business benefits of the ocean.
- **Environment:** IOOS is the key to protecting our environment for generations to come.

News and Highlights

- [Highlights Briefs](#)
- 56% of Coastal observing comes from IOOS. [Coastal observing network](#)
- By using IOOS data and High Frequency Radars, HF Radars, search and rescue areas are reduced by 66% in 96 hours. [High Frequency Radars](#)



U.S. IOOS Data and Assets

Data, products, and services made available by national and regional coastal and ocean observing systems



Glider Fleet

Glider technologies, applications, and information on deployments



High Frequency Radars

Learn about radar technology, where radars are located, and applications of radar data



Modeling

Turning data into information; building a model Testbed; model galleries



Marine Operations

Safe and efficient shipping and boating; offshore energy; support to search and rescue



Climate Variability and Change

Status and trends of essential variables; supporting coastal communities



Ecosystems, Fisheries & Water Quality

Harmful algal blooms, hypoxia; protecting drinking water; ocean acidification, beach & near shore water quality; ecosystem based management



Coastal Hazards

Providing hazard and disaster information where and when it is needed; promoting risk-wise behavior.

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<http://ioos.gov/welcome.html>